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THE RUMPLER PASSENGER AIRPLANE.

By

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Translated by Paris Office, N.A.C.A.

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The Rumpler Limousine is a further development of the well-known type 5 A 2, which was extensively used in the war under the denomination of Ru.C.I. The machine was constructed for the military authorities in 1915, and it put all other existing types of the C class in the shade. It was flown on all the battle-fronts; in the West, in the Balkans, and over the Suez Canal. The Rumpler Works found it impossible to execute all their orders themselves, and the Ru.C.I was therefore built by license, by order of the military authorities, by many other firms. There can scarcely be another C airplane that has been constructed in anything like such large numbers, not even the D.F.W.C.V., which has certainly been widely known.

The Ru.C.I. is remarkable, above all, for its stability and consequently calm flight, and it may easily be concluded that this was exactly the type likely to be selected by the firm in the further developments of a transport airplane.

The fuselage is constructed in the ordinary manner. Its structural length is 6.95 m. without the horizontal rudder. The front spars are made of ash, the back ones of pine. The struts inside the fuselage are made of ash, in the rear half,

*"Der Motorwagen," January 10, 1921, pp. 15-16.

and of steel tubes in the front half of the fuselage as far as the passengers' cabin. The fuselage is covered with fabric on the outside. The front part, at the engine, is covered with plywood. The engine is partly encased in a cowl. The cross-section of the fuselage is rectangular. Its greatest height and greatest breadth are 0.95 m. We therefore obtain a cross-section of 0.9 square meters. The height of the after-part of the fuselage is 310 mm.

In the Ru.C.I, the observer sat behind the pilot, and had a machine-gun at his disposal, revolving on a turret in the usual manner. The airplane carried about 190 kg. of arms and munition, and also 50 kg. of bombs. In the Rumpler Passenger Airplane, the pilot's seat is located on the tank, as in C.I, but there is stick control in this case. The principal tank contains 300 liters; it is under pressure. The auxiliary tank contains 40 liters. 38 liters of lubricating oil are carried; 25 liters are contained in the tank, and 13 liters are left to the engine. The radiator contains 14 liters.

The 160 HP Mercedes engine drives a tractor-propeller 2.7 m. in diameter; the maximum width of the blades amounts to 245 mm. with a pitch of 1.85 - 1.95 m.

The airplane carries two passengers besides the pilot; they are located in a closed cabin. Long after the final development of military appliances and enlargement of the pilot's cockpit, various Rumpler machines were flown open. Later on, the seat was covered with a cupboard-like construction. The

interior of the cabin is very costly fitted up. The passengers are seated on velvet cushions. The walls are upholstered with fabric and framed with mahogany-varnished wood. The passengers sit side by side. There is a small mahogany table with drawers beside the front wall. Electric light is supplied by means of accumulators.

There are comparatively large windows of unbreakable triplex glass on all four sides, so that the view is better than in many other similar types of construction. There are two ventilation apertures in front and behind, which can be adjusted for use during flight. Communication can be carried on between the pilot and the passengers by means of a speaking-tube.

Entrance to the airplane is made by opening a side-door on the left side of the fuselage, above the upper fuselage spar, and utilizing a small ladder. This method may be described as unsatisfactory. A more favorable impression would be made if the passengers were not obliged to get in through the window, but as it is, there is at least no need to weaken the top spar by breaking a doorway through it. The strength of the fuselage is thus undiminished, nor is it necessary, for the same reason, to set the fuselage spar particularly high and thereby to cause a certain increase in air resistance and weight. Viewed with the eye of an artist, however, the fuselage shows few flowing outlines. This may be considered due to the too close following of a type already existing; but the favorable flying qualities of the type Ru.C.I. are a good reason for such careful

imitation.

The wings have but little backsweep. The angle is 174° 40 in. The V position is 177° 20 in. It is the same for the top and bottom pairs of wings. The span is 12.15 at the top, and about 10 m. at the bottom. The surface depth is the same - 1.75 m. - for the top and bottom lifting surfaces on the fuselage. The wings taper at the tip, their trailing edge being perpendicular to the longitudinal axis of the fuselage, not parallel with the leading edge.

The depth of the wing-tips is 1.66 m. at the upper lifting surface, and 1.65 m. at the lower surface. The surface area of the lower surface is 16.1 m.², of the upper surface 19.6 m.² . including the space occupied by the auxiliary gasoline tank. The spacing between the wing-ribs of the upper surface is 320 mm. as compared to 330 mm. in the lower wing. The space between the struts is stated at 0.75 m. The front edge is 170 mm. in front of the spar. The angle of incidence is 5-3/4° inside the fuselage, in the case of both wings. At the beginning of the ailerons, it is 4-3/4°, whereas it is 1/2° on the outside of the lower wing.

The cellule has a slight negative stagger, the leading edge of the upper surface projecting 16 mm. beyond that of the lower surface. The spacing between the struts, measured from the center of the fuselage outwards, is 2.175 or 2.65 m. The space between the two surfaces, top and bottom, measured inside the fuselage, is 1.86 m.

The first Rumpler biplane, type 4 A, which bore the military number Ru.B.I and was constructed in 1914, had a canopy; that is, a portion of the upper wing surface still remained. As it is now, the upper wing surface of the airplane is no longer in three parts, but in two, and it is supported on the inside by means of an A shaped bracket, over which the auxiliary tank is installed, on the surface between the two wing spars. Its shape is such as to fit exactly into the cut-out profile of the two halves of the lifting surface, in order to avoid causing air resistance. The semicircular radiator is placed in front of the auxiliary tank, against the front spar and the tightening turret.

Ash was the material used for the upper wing spars, pine being used for those of the lower surface. The wing spars are constructed like box supports, to which the two halves, glued together, are secured with pins and screws. The cross-section of the spars branches off outwards.

The control mechanism consists of the divided elevating control and the rounded-off directional control. The angle of incidence of the stabilizer in relation to the propeller shaft is 3-1/4°. The maximum height of the vertical fin is 0.8 m. Its depth is 1.12 m. and its surface area 0.43 $m.^2$. The span of the stabilizing fin is 1.78 m. The depth of the control mechanism is 1.65 m. and its surface area is 2.91 $m.^2$.

The directional control has a total area of 0.63 $m.^2$, 1.3 m. maximum height, and 0.66 m. maximum depth, whereas the

elevating control measures 0.6 or it may be 1.8 m. and has a total area of 1.71 m.^{2}. There are stabilizing ailerons for lateral control, on the upper lifting surface only. Their greatest width is 2.4 m.; depth 490 mm. on the inside, 800 mm. on the outside, with a total area of 2.59 m.^{2} lifting surface.

The unit weight of the wings is fully 166.6 kg. The streamlined cabane weighs 7.8 kg.

The landing gear is also composed of rolled steel tubing of 70 by 35 mm., with no interior reinforcement or lining. The axle of the wheel is 670 mm. behind the leading edge of the lower surface, and 1.32 m. below the propeller shaft. This gives the adjusted propeller a ground level of 1.66 m. The gauge of the wheels is stated as being 1.95 m. The tires used measure 810 by 135. The hubs are 150 mm. wide and 55 mm. in diameter. The axis of the wheels is constructed in the usual way, with elastic string or spiral wire springs. The unit weight of the landing-gear, with the springs, is 53.8 kg.

The 160 HP Mercedes engine gives the airplane a speed of about 150 km/h. This corresponds to a flying-course of 750 km. covered in an unbroken flight of five hours.

In addition to the principal tank already mentioned, under the pilot's seat, two streamlined tanks are located beside the fuselage, at the center of gravity. They thus take up no room inside the fuselage, and there is no alteration in equilibrium during the flight if they are simultaneously emptied.

The structural height of the airplane is 3.06 m. The total weight of 1333 kg. is composed of 823 kg. weight empty, and 510 kg. useful load.